

*Nitrification and
Denitrification in the
Activated Sludge Process*

Nitrification and Denitrification in the Activated Sludge Process

Michael H. Gerardi



A John Wiley & Sons, Inc., Publication

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Published simultaneously in Canada.

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For ordering and customer service, call 1-800-CALL-WILEY.

Library of Congress Cataloging-in-Publication Data:

Gerardi, Michael H.

Wastewater microbiology : nitrification/denitrification in the activated sludge process / Michael H. Gerardi.

p. cm.

Includes bibliographical references.

ISBN 0-471-06508-0 (cloth : alk. paper)

1. Sewage—Purification—Nitrogen removal. 2. Nitrification. 3. Sewage—Purification—Activated sludge process. I. Title.

TD758.3.N58 G47 2002

2001046765

Printed in the United States of America.

10 9 8 7 6 5 4 3 2 1

*To
L. Vernon Frye
and
the men and women of the
Williamsport Sanitary Authority
and
Williamsport Municipal Water Authority*

*The author extends his sincere appreciation to
joVanna Gerardi for computer support
and
Cristopher Noviello for artwork used in this text.*

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Preface

Within the last 15 years much interest and use of microbiological principles of wastewater treatment have been successfully applied to the activated sludge process. These principles include the use of the microscope for process control and a better understanding of the microorganisms, especially the bacteria that are involved in the degradation of wastes.

Of special interest to wastewater treatment plant operators are the bacteria that degrade nitrogenous wastes—the nitrifying bacteria—and the bacteria that degrade carbonaceous wastes—the cBOD-removing bacteria. Both groups of bacteria need to be routinely monitored and operational conditions favorably adjusted to ensure desired nitrification. However, operational conditions do change, often in a very short period of time, and an undesired change in operational conditions can adversely affect the bacteria within the activated sludge process and its ability to degrade wastes.

Regardless of discharge permit limitations, activated sludge processes that are and are not required to nitrify and denitrify do nitrify and denitrify. Often these plants develop a form of incomplete nitrification or undesired denitrification that is responsible for an operational upset, an increase in operational costs, and noncompliance with a discharge limitation. Therefore, with a minimum of technical jargon and numerous tables and illustrations, this book addresses the microbiological principles of the bacteria and operational conditions that affect nitrification and denitrification in the activated sludge pro-

cess. The book is target for operators who are responsible for the daily operation of the activated sludge process regardless if the process is or is not required to nitrify or denitrify. Each chapter is prepared to offer a better understanding of the importance of nitrification and denitrification and the bacteria involved in nitrification and denitrification. The book provides the operator with process control and troubleshooting measures that help to maintain permit compliance and cost-effective operation.

Nitrification and Denitrification in the Activated Sludge Process is the first book in the Wastewater Microbiology series by John Wiley & Sons. This series is designed for operators and provides a microbiological review of the organisms involved in wastewater treatment, their beneficial and detrimental roles, and the biological techniques available for operators to monitor and regulate the activities of these organisms.

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